Quantification of Inhomogeneities in Inorganic Melts

Jensen, Martin; Keding, Ralf; Solvang, Mette; Yue, Yuanzheng

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Characterization of Homogeneity in Stone Wool Melts

M. Jensen*[1], R. Keding[1], M. Solvang[2], Y.Z. Yue[1]
[1]Section of Chemistry, Aalborg University, Aalborg, Denmark
[2]Rockwool International A/S, Hedehusene, Denmark

Despite the high performance and wide application of stone wool as insulation materials, the fiber spinning process and fiber properties still need to be optimized. To do so, it is important to better understand the relationships among the melt properties, the fiber spinning process and the fiber properties. In order to gain knowledge on these relationships, the melt properties must be characterized. In this work, we focus on characterization of the melt homogeneity, which is considered to be one of the crucial properties for stone wool manufacturing. Commonly, glass homogeneity, which reflects the melt homogeneity, is measured by means of optical methods or electron microprobe. However, the presence of iron ions in stone wool melts complicates optical measurements. Electron microprobe measurements are not suitable for characterizing seeds and bubbles in the glass. Therefore, we suggest methods capable of characterizing the inhomogeneity of stone wool melts such as bubbles, seeds, striae, and crystallites. Those methods are based on the optical transmission, reflection and scattering techniques. The results obtained by these methods demonstrate that the homogeneity of stone wool melts depends on the difference in melting techniques and on the melting conditions. Such dependence has been quantified. The source of the inhomogeneity has been discussed.